WHAT IS CLAIMED IS:

1. A magnetic memory device comprising:

first wiring which runs in a first direction;

second wiring which runs in a second direction different from the first direction;

a magneto-resistance element which is arranged between the first wiring and the second wiring at an intersection between the first wiring and the second wiring;

a first yoke main body which covers at least either of a lower surface and two side surfaces of the first wring;

a second yoke main body which covers at least either of an upper surface and two side surfaces of the second wiring;

first and second yoke tips which are arranged on two sides of the magneto-resistance element in the first direction at an interval from the magneto-resistance element; and

third and fourth yoke tips which are arranged on two sides of the magneto-resistance element in the second direction at an interval from the magneto-resistance element.

2. The device according to claim 1, wherein the first and second yoke tips are in contact with the second yoke main body and spaced apart from the first yoke main body.

3. The device according to claim 1, wherein the first and second yoke tips are magnetically coupled to the second yoke main body.

4. The device according to claim 1, wherein the third and fourth yoke tips are in contact with the first yoke main body and spaced apart from the second yoke main body.

5. The device according to claim 1, wherein the third and fourth yoke tips are magnetically coupled to the first yoke main body.

6. The device according to claim 1, wherein the first to fourth yoke tips are separated from each other.

7. The device according to claim 1, wherein the first to fourth yoke tips are formed on a same surface.

8. The device according to claim 1, wherein distances between the first to fourth yoke tips and the magneto-resistance element are equal to distances between the first to fourth yoke tips and the first wiring.

9. The device according to claim 1, wherein distances between the first to fourth yoke tips and the magneto-resistance element are equal to each other.

10. The device according to claim 1, wherein a distance between the magneto-resistance element and the first yoke main body and a distance between the magneto-resistance element and the second yoke main

body are equal to each other.

11. The device according to claim 1, further comprising an insulating film which is formed between the first to fourth yoke tips and the magneto-resistance element and formed between the first to fourth yoke tips and the first wiring.

12. The device according to claim 1, wherein the first to fourth yoke tips have an easy axis of magnetization which orients in a long direction of the magneto-resistance element.

13. The device according to claim 12, wherein the easy axis of magnetization has uniaxial anisotropy.

14. The device according to claim 1, wherein the first to fourth yoke tips are formed from a material different from a material of the first and second yoke main bodies.

15. The device according to claim 1, wherein the first to fourth yoke tips and the first and second yoke main bodies are formed from a soft magnetic layer.

16. The device according to claim 1, wherein the first to fourth yoke tips have a permeability higher than a permeability of the first and second yoke main bodies.

17. The device according to claim 16, wherein

the first to fourth yoke tips are formed from NiFe, and

the first and second yoke main bodies are formed

from either of amorphous-CoZrNb and FeAlSi.

18. The device according to claim 1, wherein the first to fourth yoke tips have a higher saturation flux density than a saturation flux density of the first and second yoke main bodies.

19. The device according to claim 18, wherein

the first to fourth yoke tips are formed from one of CoFe, amorphous-CoZrNb, and FeN_X, and

the first and second yoke main bodies are formed from NiFe.

20. The device according to claim 1, wherein the first to fourth yoke tips are formed in self-alignment with the magneto-resistance element.

21. The device according to claim 1, wherein

the first and second yoke tips guide to the magneto-resistance element a magnetic flux generated by a write current flowing through the second wiring, and

the third and fourth yoke tips guide to the magneto-resistance element a magnetic flux generated by a write current flowing through the first wiring.

22. The device according to claim 1, wherein

the first to fourth yoke tips have first side surfaces facing the magneto-resistance element and second side surfaces opposite to the first side surfaces, and

a width of each first side surface is smaller than a width of each second side surface.

23. The device according to claim 1, wherein

the first to fourth yoke tips have first side surfaces facing the magneto-resistance element and second side surfaces opposite to the first side surfaces, and

a planar shape of the first to fourth yoke tips is a trapezoidal shape in which a width of each first side surface is smaller than a width of each second side surface.

24. The device according to claim 1, wherein a planar shape of the magneto-resistance element is elliptic.

25. The device according to claim 24, wherein

the first to fourth yoke tips have first side surfaces facing the magneto-resistance element and second side surfaces opposite to the first side surfaces, and

the first side surfaces form a curve along a shape of the magneto-resistance element.

26. The device according to claim 25, wherein a width of each first side surface is smaller than a width of each second side surface.

27. The device according to claim 25, wherein a planar shape of the first to fourth yoke tips is a trapezoidal shape in which a width of each first side surface is smaller than a width of each second side surface.

28. The device according to claim 1, wherein outer surfaces of the first and second yoke tips are flush with a side surface of the second yoke main body.

29. The device according to claim 1, wherein outer surfaces of the third and fourth yoke tips are flush with a side surface of the first yoke main body.

30. The device according to claim 1, wherein the first and second yoke tips have projections at which outer surfaces of the first and second yoke tips project from a side surface of the second yoke main body.

31. The device according to claim 1, wherein the third and fourth yoke tips have projections at which outer surfaces of the third and fourth yoke tips project from a side surface of the first yoke main body.

32. A magnetic memory device comprising:

first wiring which runs in a first direction;

second wiring which runs in a second direction different from the first direction;

a magneto-resistance element which is arranged between the first wiring and the second wiring at an intersection between the first wiring and the second wiring;

a first yoke main body which covers at least either of a lower surface and two side surfaces of the first wring;

a second yoke main body which covers at least either of an upper surface and two side surfaces of the second wiring;

first and second yoke tips which are arranged on two sides of the magneto-resistance element in the first direction at an interval from the magneto-resistance element;

third and fourth yoke tips which are arranged on two sides of the magneto-resistance element in the second direction at an interval from the magneto-resistance element;

a metal layer which is connected to the magneto-resistance element;

a contact layer which is connected to the metal layer; and

a transistor which is connected to the contact layer.

33. The device according to claim 32, further comprising an insulating film which is formed between the metal layer and the first wiring.

34. The device according to claim 32, wherein the metal layer and the first wiring are in contact with each other.

35. The device according to claim 32, wherein the metal layer and the first wiring are in contact with each other, and

the third and fourth yoke tips are in contact with

the first yoke main body.

36. The device according to claim 35, wherein the contact layer is arranged outside the second wiring.

37. The device according to claim 1, further comprising third wiring connected to the magneto-resistance element, and

in that the magneto-resistance element is spaced apart from the first wiring and in contact with the second wiring, and

the third and fourth yoke tips are in contact with the first yoke main body.

38. The device according to claim 37, wherein the third wiring includes read wiring.

39. The device according to claim 1, wherein the magneto-resistance element includes an MTJ element formed from a first magnetic layer, a second magnetic layer, and a nonmagnetic layer sandwiched between the first and second magnetic layers.

40. The device according to claim 39, wherein the MTJ element has a double junction structure that the nonmagnetic layer has a two-layered.

41. The device according to claim 39, wherein at least one of the first and second magnetic layers includes a three-layered structure formed from a first ferromagnetic layer, a second ferromagnetic layer, and a nonmagnetic layer sandwiched between the first and second ferromagnetic layers.

42. The device according to claim 1, wherein

the first and second yoke tips are arranged on two sides of a long direction of the magneto-resistance element, and

distances between the first and second yoke tips and the magneto-resistance element are shorter than distances between the third and fourth yoke tips and the magneto-resistance element.

43. The device according to claim 1, wherein

the first and second yoke tips are arranged on two sides of a long direction of the magneto-resistance element, and

aspect ratios of the first and second yoke tips are lower than aspect ratios of the third and fourth yoke tips.

44. The device according to claim 43, wherein

the first and second yoke tips have a square shape, and

the third and fourth yoke tips have a rectangular shape elongated in the long direction.

45. The device according to claim 1, wherein

the second yoke main body is arranged on two sides of a long direction of the magneto-resistance element, and

a distance between the second yoke main body and the magneto-resistance element is shorter than a distance between the first yoke main body and the

magneto-resistance element.

46. The device according to claim 1, wherein the first to fourth yoke tips are continuously formed around the magneto-resistance element.

47. The device according to claim 1, wherein the magneto-resistance element and the first to fourth yoke tips are formed from the same material.

48. The device according to claim 1, wherein the first to fourth yoke tips have a layered structure of a magnetic film.

49. The device according to claim 48, wherein the layered structure is identical to a layered structure of the magneto-resistance element.

50. The device according to claim 1, wherein the magneto-resistance element and the first to fourth yoke tips are arranged in contact with the second wiring.

51. The device according to claim 1, wherein an anti-ferromagnetic layer is formed on or below the first to fourth yoke tips.

52. The device according to claim 1, wherein the first and second yoke main bodies have a layered structure of a magnetic film.

53. The device according to claim 1, further comprising first and second layers which sandwich the magneto-resistance layer and are in contact with the magneto-resistance layer.

54. The device according to claim 53, wherein the

first and second layers include metal layers.

55. The device according to claim 53, wherein either of the first and second layers includes a diode layer.

56. A magnetic memory device manufacturing method, comprising:

forming first wiring, at least either of a lower surface and two side surfaces of which is covered with a first yoke main body;

forming on the first wiring a magneto-resistance element which is sandwiched between first and second layers;

forming an insulating film on the first wiring and the second layer;

forming a magnetic film on the insulating film;

patterning the magnetic film;

removing part of the second layer, the magnetic film, and the insulating film on the magneto-resistance element to form first to fourth yoke tips from the magnetic film in self-alignment with the magneto-resistance element;

forming second wiring on the second layer and the first to fourth yoke tips; and

forming a second yoke main body which covers at least either of an upper surface and two side surfaces of the second wiring.

57. A magnetic memory device manufacturing method,

comprising:

forming first wiring, at least either of a lower surface and two side surfaces of which is covered with a first yoke main body;

forming on the first wiring a magneto-resistance element which is sandwiched between first and second layers;

forming an insulating film on the first wiring and the second layer;

forming a magnetic film on the insulating film;

removing part of the second layer, the magnetic film, and the insulating film on the magneto-resistance element;

patterning the magnetic film to form first to fourth yoke tips from the magnetic film in self-alignment with the magneto-resistance element;

forming second wiring on the second layer and the first to fourth yoke tips; and

forming a second yoke main body which covers at least either of an upper surface and two side surfaces of the second wiring.

58. The method according to claim 56, wherein part of the second layer, the magnetic film, and the insulating film on the magneto-resistance element are removed using either of etch-back and CMP.

59. The method according to claim 56, wherein part of the second layer, the magnetic film, and the

insulating film on the magneto-resistance element are removed until surfaces of the second layer, the insulating layer, and the magnetic layer become flat.

60. The method according to claim 56, wherein a step portion is left on a surface of the magnetic film when part of the second layer, the magnetic film, and the insulating film on the magneto-resistance element are removed.

61. The method according to claim 56, further comprising:

forming a mask layer after forming the magnetic film on the insulating film;

patterning the mask layer; and

patterning the magnetic layer using the patterned mask layer.

62. The method according to claim 56, wherein the first and second yoke tips are formed to contact the second yoke main body and be spaced apart from the first yoke main body.

63. The method according to claim 56, wherein the first and second yoke tips are formed to be magnetically coupled to the second yoke main body.

64. The method according to claim 56, wherein the third and fourth yoke tips are formed to contact the first yoke main body and be spaced apart from the second yoke main body.

65. The method according to claim 56, wherein the third and fourth yoke tips are formed to be magnetically coupled to the first yoke main body.

66. The method according to claim 56, wherein the magnetic film is patterned to separate the first to fourth yoke tips from each other.

67. The method according to claim 56, wherein the first to fourth yoke tips are formed to make distances between the first to fourth yoke tips and the magneto-resistance element equal to distances between the first to fourth yoke tips and the first wiring.

68. The method according to claim 56, wherein the first to fourth yoke tips are formed to make distances between the first to fourth yoke tips and the magneto-resistance element equal to each other.

69. The method according to claim 56, wherein the first to fourth yoke tips are formed to make a distance between the magneto-resistance element and the first yoke main body equal to a distance between the magneto-resistance element and the second yoke main body.

70. The method according to claim 56, wherein the magneto-resistance element includes an MTJ element formed from a first magnetic layer, a second magnetic layer, and a nonmagnetic layer sandwiched between the first and second magnetic layers.

71. The method according to claim 56, wherein when the first and second yoke tips are formed on two sides

of a long direction of the magneto-resistance element,

the first to fourth yoke tips are formed to make distances between the first and second yoke tips and the magneto-resistance element shorter than distances between the third and fourth yoke tips and the magneto-resistance element.

72. The method according to claim 56, wherein when the first and second yoke tips are formed on two sides of a long direction of the magneto-resistance element,

a film thickness of the insulating film on side surfaces of the magneto-resistance element facing the first and second yoke tips are made smaller than a film thickness of the insulating film on side surfaces of the magneto-resistance element facing the third and fourth yoke tips by moving a substrate in a direction perpendicular to the long direction when forming the insulating film by sputtering.

73. The method according to claim 56, wherein when the first and second yoke tips are formed on two sides of a long direction of the magneto-resistance element,

the first to fourth yoke tips are formed to make aspect ratios of the first and second yoke tips lower than aspect ratios of the third and fourth yoke tips.

74. The method according to claim 56, wherein when the second yoke main body is formed on two sides of a long direction of the magneto-resistance element,

the first and second yoke main bodies are formed

to make a distance between the second yoke main body and the magneto-resistance element shorter than a distance between the first yoke main body and the magneto-resistance element.

75. The method according to claim 56, wherein the magnetic film is patterned to continuously form the first to fourth yoke tips around the magneto-resistance element.

76. A magnetic memory device manufacturing method, comprising:

forming first wiring, at least either of a lower surface and two side surfaces of which is covered with a first yoke main body;

forming an element material layer from a magneto-resistance element material sandwiched between first and second layers on the first wiring;

forming a first material layer having a magneto-resistance element shape on the element material layer;

forming a second material layer on the first material layer and the element material layer;

forming a third material layer on the second material layer;

planarizing the second and third material layers until the first material layer is exposed;

removing the second material layer exposed between the first and third material layers to expose the element material layer;

selectively removing the element material layer to form a magneto-resistance element and a yoke tip from the element material layer;

forming second wiring on the magneto-resistance element; and

forming a second yoke main body which covers at least either of an upper surface and two side surfaces of the second wiring.

77. The method according to claim 76, wherein the first and second yoke main bodies are formed from a layered structure of a magnetic film.

78. The method according to claim 76, wherein the first and second material layers are formed from different materials.

79. The method according to claim 76, wherein the first and third material layers are formed from a same material.

80. The method according to claim 56, wherein the first and second layers include metal layers.

81. The method according to claim 56, wherein either of the first and second layers includes a diode layer.